



SEQUENCE LISTING

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<120> Twin-Arginine Translocation in Bacillus

<130> GC634-2

<140> US 09/954,737

<141> 2001-09-17

<150> US 60/233,610

<151> 2000-09-18

<160> 29

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 89

<212> PRT

<213> Escherichia coli

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Val	Leu	Leu	Phe	Gly	Thr	Lys	Lys	Leu	Gly	Ser	Ile	Gly	Ser	Asp	Leu
			20					25					30		
Gly	Ala	Ser	Ile	Lys	Gly	Phe	Lys	Lys	Ala	Met	Ser	Asp	Asp	Glu	Pro
		35					40					45			
Lys	Gln	Asp	Lys	Thr	Ser	Gln	Asp	Ala	Asp	Phe	Thr	Ala	Lys	Thr	Ile
	50					55				60					
Ala	Asp	Lys	Gln	Ala	Asp	Thr	Asn	Gln	Glu	Gln	Ala	Lys	Thr	Glu	Asp
65					70				75					80	
Ala	Lys	Arg	His	Asp	Lys	Glu	Gln	Val							
				85											

<210> 2

<211> 67

<212> PRT

<213> Escherichia coli

<400> 2

Met	Gly	Glu	Ile	Ser	Ile	Thr	Lys	Leu	Leu	Val	Val	Ala	Ala	Leu	Val
1				5					10					15	
Val	Leu	Leu	Phe	Gly	Thr	Lys	Lys	Leu	Arg	Thr	Leu	Gly	Gly	Asp	Leu
			20					25					30		
Gly	Ala	Ala	Ile	Lys	Gly	Phe	Lys	Lys	Ala	Met	Asn	Asp	Asp	Asp	Ala
		35					40					45			
Ala	Ala	Lys	Lys	Gly	Ala	Asp	Val	Asp	Leu	Gln	Ala	Glu	Lys	Leu	Ser
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His	Lys	Glu													

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<210> 3

<211> 57

<212> PRT

<213> *Bacillus subtilis*

<400> 3

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Met Pro Ile Gly Pro Gly Ser Leu Ala Val Ile Ala Ile Val Ala Leu
 1           5           10           15
Ile Ile Phe Gly Pro Lys Lys Leu Pro Glu Leu Gly Lys Ala Ala Gly
      20           25           30
Asp Thr Leu Arg Glu Phe Lys Asn Ala Thr Lys Gly Leu Thr Ser Asp
      35           40           45
Glu Glu Glu Lys Lys Lys Glu Asp Gln
 50           55
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<210> 4

<211> 70

<212> PRT

<213> *Bacillus subtilis*

<400> 4

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Met Phe Ser Asn Ile Gly Ile Pro Gly Leu Ile Leu Ile Phe Val Ile
 1           5           10           15
Ala Ile Ile Ile Phe Gly Pro Ser Lys Leu Pro Glu Ile Gly Arg Ala
      20           25           30
Ala Lys Arg Thr Leu Leu Glu Phe Lys Ser Ala Thr Lys Ser Leu Val
      35           40           45
Ser Gly Asp Glu Lys Glu Glu Lys Ser Ala Glu Leu Thr Ala Val Lys
      50           55           60
Gln Asp Lys Asn Ala Gly
65           70
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<210> 5

<211> 62

<212> PRT

<213> *Bacillus subtilis*

<400> 5

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Met Glu Leu Ser Phe Thr Lys Ile Leu Val Ile Leu Phe Val Gly Phe
 1           5           10           15
Leu Val Phe Gly Pro Asp Lys Leu Pro Ala Leu Gly Arg Ala Ala Gly
      20           25           30
Lys Ala Leu Ser Glu Phe Lys Gln Ala Thr Ser Gly Leu Thr Gln Asp
      35           40           45
Ile Arg Lys Asn Asp Ser Glu Asn Lys Glu Asp Lys Gln Met
      50           55           60
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<210> 6

<211> 171

<212> PRT

<213> *Escherichia coli*

<400> 6

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Met Phe Asp Ile Gly Phe Ser Glu Leu Leu Leu Val Phe Ile Ile Gly
 1           5           10           15
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Leu	Val	Val	Leu	Gly	Pro	Gln	Arg	Leu	Pro	Val	Ala	Val	Lys	Thr	Val
			20					25					30		
Ala	Gly	Trp	Ile	Arg	Ala	Leu	Arg	Ser	Leu	Ala	Thr	Thr	Val	Gln	Asn
		35					40					45			
Glu	Leu	Thr	Gln	Glu	Leu	Lys	Leu	Gln	Glu	Phe	Gln	Asp	Ser	Leu	Lys
	50					55				60					
Lys	Val	Glu	Lys	Ala	Ser	Leu	Thr	Asn	Leu	Thr	Pro	Glu	Leu	Lys	Ala
65					70					75					80
Ser	Met	Asp	Glu	Leu	Arg	Gln	Ala	Ala	Glu	Ser	Met	Lys	Arg	Ser	Tyr
			85						90					95	
Val	Ala	Asn	Asp	Pro	Glu	Lys	Ala	Ser	Asp	Glu	Ala	His	Thr	Ile	His
			100						105				110		
Asn	Pro	Val	Val	Lys	Asp	Asn	Glu	Ala	Ala	His	Glu	Gly	Val	Thr	Pro
		115					120					125			
Ala	Ala	Ala	Gln	Thr	Gln	Ala	Ser	Ser	Pro	Glu	Gln	Lys	Pro	Glu	Thr
		130				135					140				
Thr	Pro	Glu	Pro	Val	Val	Lys	Pro	Ala	Ala	Asp	Ala	Glu	Pro	Lys	Thr
145					150					155					160
Ala	Ala	Pro	Ser	Pro	Ser	Ser	Ser	Asp	Lys	Pro					
				165					170						

<210> 7

<211> 258

<212> PRT

<213> Escherichia coli

<400> 7

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1				5					10					15	
Arg	Lys	Arg	Leu	Asn	Cys	Ile	Ile	Ala	Val	Ile	Val	Ile	Phe	Leu	
			20					25				30			
Cys	Leu	Val	Tyr	Phe	Ala	Asn	Asp	Ile	Tyr	His	Leu	Val	Ser	Ala	Pro
		35					40				45				
Leu	Ile	Lys	Gln	Leu	Pro	Gln	Gly	Ser	Thr	Met	Ile	Ala	Thr	Asp	Val
	50					55					60				
Ala	Ser	Pro	Phe	Phe	Thr	Pro	Ile	Lys	Leu	Thr	Phe	Met	Val	Ser	Leu
65					70					75					80
Ile	Leu	Ser	Ala	Pro	Val	Ile	Leu	Tyr	Gln	Val	Trp	Ala	Phe	Ile	Ala
				85					90					95	
Pro	Ala	Leu	Tyr	Lys	His	Glu	Arg	Arg	Leu	Val	Val	Pro	Leu	Leu	Val
			100					105					110		
Ser	Ser	Ser	Leu	Leu	Phe	Tyr	Ile	Gly	Met	Ala	Phe	Ala	Tyr	Phe	Val
		115					120					125			
Val	Phe	Pro	Leu	Ala	Phe	Gly	Phe	Leu	Ala	Asn	Thr	Ala	Pro	Glu	Gly
	130					135					140				
Val	Gln	Val	Ser	Thr	Asp	Ile	Ala	Ser	Tyr	Leu	Ser	Phe	Val	Met	Ala
145					150					155					160
Leu	Phe	Met	Ala	Phe	Gly	Val	Ser	Phe	Glu	Val	Pro	Val	Ala	Ile	Val
				165					170					175	
Leu	Leu	Cys	Trp	Met	Gly	Ile	Thr	Ser	Pro	Glu	Asp	Leu	Arg	Lys	Lys
			180					185					190		
Arg	Pro	Tyr	Val	Leu	Val	Gly	Ala	Phe	Val	Val	Gly	Met	Leu	Leu	Thr
		195					200					205			
Pro	Pro	Asp	Val	Phe	Ser	Gln	Thr	Leu	Leu	Ala	Ile	Pro	Met	Tyr	Cys
		210				215					220				
Leu	Phe	Glu	Ile	Gly	Val	Phe	Phe	Ser	Arg	Phe	Tyr	Val	Gly	Lys	Gly
225					230					235					240

Arg Asn Arg Glu Glu Glu Asn Asp Ala Glu Ala Glu Ser Glu Lys Thr
 245 250 255
 Glu Glu

<210> 8
 <211> 254
 <212> PRT
 <213> Bacillus subtilis

<400> 8
 Met Thr Arg Met Lys Val Asn Gln Met Ser Leu Leu Glu His Ile Ala
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 20 25 30
 Phe Ile Ala Gly Phe Phe Leu Ala Lys Pro Ile Ile Val Tyr Leu Gln
 35 40 45
 Glu Thr Asp Glu Ala Lys Gln Leu Thr Leu Asn Ala Phe Asn Leu Thr
 50 55 60
 Asp Pro Leu Tyr Val Phe Met Gln Phe Ala Phe Ile Ile Gly Ile Val
 65 70 75 80
 Leu Thr Ser Pro Val Ile Leu Tyr Gln Leu Trp Ala Phe Val Ser Pro
 85 90 95
 Gly Leu Tyr Glu Lys Glu Arg Lys Val Thr Leu Ser Tyr Ile Pro Val
 100 105 110
 Ser Ile Leu Leu Phe Leu Ala Gly Leu Ser Phe Ser Tyr Tyr Ile Leu
 115 120 125
 Phe Pro Phe Val Val Asp Phe Met Lys Arg Ile Ser Gln Asp Leu Asn
 130 135 140
 Val Asn Gln Val Ile Gly Ile Asn Glu Tyr Phe His Phe Leu Leu Gln
 145 150 155 160
 Leu Thr Ile Pro Phe Gly Leu Leu Phe Gln Met Pro Val Ile Leu Met
 165 170 175
 Phe Leu Thr Arg Leu Gly Ile Val Thr Pro Met Phe Leu Ala Lys Ile
 180 185 190
 Arg Lys Tyr Ala Tyr Phe Thr Leu Leu Val Ile Ala Ala Leu Ile Thr
 195 200 205
 Pro Pro Glu Leu Leu Ser His Met Met Val Thr Val Pro Leu Leu Ile
 210 215 220
 Leu Tyr Glu Ile Ser Ile Leu Ile Ser Lys Ala Ala Tyr Arg Lys Ala
 225 230 235 240
 Gln Lys Ser Ser Ala Ala Asp Arg Asp Val Ser Ser Gly Gln
 245 250

<210> 9
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 <212> PRT
 <213> Bacillus subtilis

<400> 9
 Met Asp Lys Lys Glu Thr His Leu Ile Gly His Leu Glu Glu Leu Arg
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 Arg Arg Ile Ile Val Thr Leu Ala Ala Phe Phe Leu Phe Leu Ile Thr
 20 25 30
 Ala Phe Leu Phe Val Gln Asp Ile Tyr Asp Trp Leu Ile Arg Asp Leu
 35 40 45
 Asp Gly Lys Leu Ala Val Leu Gly Pro Ser Glu Ile Leu Trp Val Tyr

50	55	60
Met Met Leu Ser Gly Ile Cys Ala Ile Ala Ala Ser Ile Pro Val Ala		
65	70	75
Ala Tyr Gln Leu Trp Arg Phe Val Ala Pro Ala Leu Thr Lys Thr Glu		80
	85	90
Arg Lys Val Thr Ile Met Tyr Ile Met Tyr Ile Pro Gly Leu Phe Ala		95
	100	105
Leu Phe Leu Ala Gly Ile Ser Phe Gly Tyr Phe Val Leu Phe Pro Ile		110
	115	120
Val Leu Ser Phe Leu Thr His Leu Ser Ser Gly His Phe Glu Thr Met		125
	130	135
Phe Thr Ala Asp Arg Tyr Phe Arg Phe Met Val Asn Leu Ser Leu Pro		140
145	150	155
Phe Gly Phe Leu Phe Glu Met Pro Leu Val Val Met Phe Leu Thr Arg		160
	165	170
Leu Gly Ile Leu Asn Pro Tyr Arg Leu Ala Lys Ala Arg Lys Leu Ser		175
	180	185
Tyr Phe Leu Leu Ile Val Val Ser Ile Leu Ile Thr Pro Pro Asp Phe		190
	195	200
Ile Ser Asp Phe Leu Val Met Ile Pro Leu Leu Val Leu Phe Glu Val		205
	210	215
Ser Val Thr Leu Ser Ala Phe Val Tyr Lys Lys Arg Met Arg Glu Glu		220
225	230	235
Thr Ala Ala Ala Ala		240
	245	

<210> 10

<211> 63

<212> PRT

<213> Bacillus alcalophilus

<400> 10

Met Gly Gly Leu Ser Val Gly Ser Val Val Leu Ile Ala Leu Val Ala	
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Leu Leu Ile Phe Gly Pro Lys Lys Leu Pro Glu Leu Gly Lys Ala Ala	10
	15
	20
Gly Ser Thr Leu Arg Glu Phe Lys Asn Ala Thr Lys Gly Leu Ala Asp	25
	30
	35
Asp Asp Asp Asp Thr Lys Ser Thr Asn Val Gln Lys Glu Lys Ala	40
	45
	50
	55
	60

<210> 11

<211> 272

<212> PRT

<213> Bacillus alcalophilus

<400> 11

Met Thr Met Met Thr Pro Asn Gln Gln Thr Ser Lys Lys Lys Lys Arg	
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Lys Gly Arg Lys Gly Arg Val Pro Met Gln Asp Met Ser Ile Met Asp	10
	15
	20
His Ala Glu Glu Leu Arg Arg Arg Ile Phe Val Val Leu Ala Phe Phe	25
	30
	35
Ile Val Ala Leu Ile Gly Gly Phe Phe Leu Ala Val Pro Val Ile Thr	40
	45
	50
Phe Leu Gln Asn Ser Pro Gln Ala Ala Asp Met Pro Phe Asn Ala Phe	55
65	70
	75
	80

Arg	Leu	Thr	Asp	Pro	Leu	Arg	Val	Tyr	Met	Asn	Phe	Ala	Val	Ile	Thr
				85					90					95	
Ala	Leu	Val	Leu	Ile	Ile	Pro	Val	Ile	Leu	Tyr	Gln	Leu	Trp	Ala	Phe
			100					105					110		
Val	Ser	Pro	Gly	Leu	Lys	Glu	Asn	Glu	Gln	Lys	Ala	Thr	Leu	Ala	Tyr
		115					120					125			
Ile	Pro	Ile	Ala	Phe	Leu	Leu	Phe	Leu	Ala	Gly	Ile	Ala	Phe	Ser	Tyr
	130					135					140				
Phe	Ile	Leu	Leu	Pro	Phe	Val	Ile	Ser	Phe	Met	Gly	Gln	Met	Ala	Asp
145					150					155					160
Arg	Leu	Glu	Ile	Asn	Glu	Met	Tyr	Gly	Ile	Asn	Glu	Tyr	Phe	Ser	Phe
				165					170					175	
Leu	Phe	Gln	Leu	Thr	Ile	Pro	Phe	Gly	Leu	Leu	Phe	Gln	Leu	Pro	Val
			180					185					190		
Val	Val	Met	Phe	Leu	Thr	Arg	Leu	Gly	Val	Val	Thr	Pro	Thr	Phe	Leu
		195					200					205			
Arg	Lys	Ile	Arg	Lys	Tyr	Ala	Tyr	Phe	Ala	Leu	Leu	Val	Ile	Ala	Gly
	210					215						220			
Ile	Ile	Thr	Pro	Pro	Glu	Leu	Thr	Ser	His	Leu	Phe	Val	Thr	Val	Pro
225					230					235					240
Met	Leu	Ile	Leu	Tyr	Glu	Ile	Ser	Ile	Thr	Ile	Ser	Ala	Ile	Thr	Tyr
				245					250					255	
Arg	Lys	Tyr	His	Gly	Thr	Thr	Asp	His	Asn	Gly	Gln	Glu	Ser	Ala	Lys
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<220>
 <223> primer

<400> 12
 cccaagctta tgaaagggag ggcttttttg aatgg

35

<210> 13
 <211> 26
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 13
 gcggatccaa agctgagcac gatcgg

26

<210> 14
 <211> 39
 <212> DNA
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<220>
 <223> primer

<400> 14
 cccaagctta aaaagaaaga agatcagtaa gttaggatg

39

<210> 15
 <211> 25
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> primer

 <400> 15
 gcggatccaa gtcctgagaa atccg 25

 <210> 16
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 <220>
 <223> primer

 <400> 16
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 <210> 17
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 <220>
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 <400> 17
 cgggatccat catgggaagc g 21

 <210> 18
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 <220>
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 <400> 18
 ggggtaccgg aaaacgcttg atcagg 26

 <210> 19
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 <220>
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 <400> 19
 cgggatcctt tgggcgatag cc 22

 <210> 20

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 <400> 20
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 gtaggatccg cgcctaactt ctcaagc 27

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 <211> 24
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35

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<211> 26

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26

<210> 27

<211> 23

<212> DNA

<213> Artificial Sequence

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<223> primer

<400> 27

gggaattcat ggcctgcccg gtt

23

<210> 28

<211> 24

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 28

caaggatccc gaattaagga gtgg

24

<210> 29

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 29

ggtctgcagc tgcactaagc ggccgcc

27